

General Physics

## COMPUTER SIMULATIONS OF CYCLOATOM DYNAMICS\*

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We explain resonant states created in an atomic hydrogen by a relatively weak laser field and a strong magnetic field. [1,2] To better understand the formation of such a ring shaped relativistic state we present a two-vector model that allow the velocity diffusion during the time evolution caused by the relativistic mass increase. The diffusion model seems to explain the main feature of the cycloatom state when cyclotron frequency matches the laser frequency. To understand the more complicated circumstances when cyclotron frequency of the applied magnetic field is only a fraction of the laser frequency we systematically analyze the effect of (1) kinematic relativity, (2) the magnetic component of the laser field, and (3) the electric component of the laser field on the fractional cycloatom resonance [3]. The understanding here is crucial in generalizing the model to two electron systems and making better suggestions for any experimental verifications.

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[1] J.C. Henderson, Q. Su and R. Grobe, **Laser Phys.** (submitted).

[2] P.J. Peverly, J.C. Henderson, Q. Su and R. Grobe, **Laser Phys.** (submitted).

[3] R. E. Wagner, S. Radovich, J. Gillespie, Q. Su and R. Grobe, **Phy. Rev. A** 66, 043412 (2002). also published in **Virtual Journal of Ultrafast Science**, Vol.1 Issue 6, November 2002.